



# High Level Architecture Overview



**Integrated Training Program**

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# High Level Architecture

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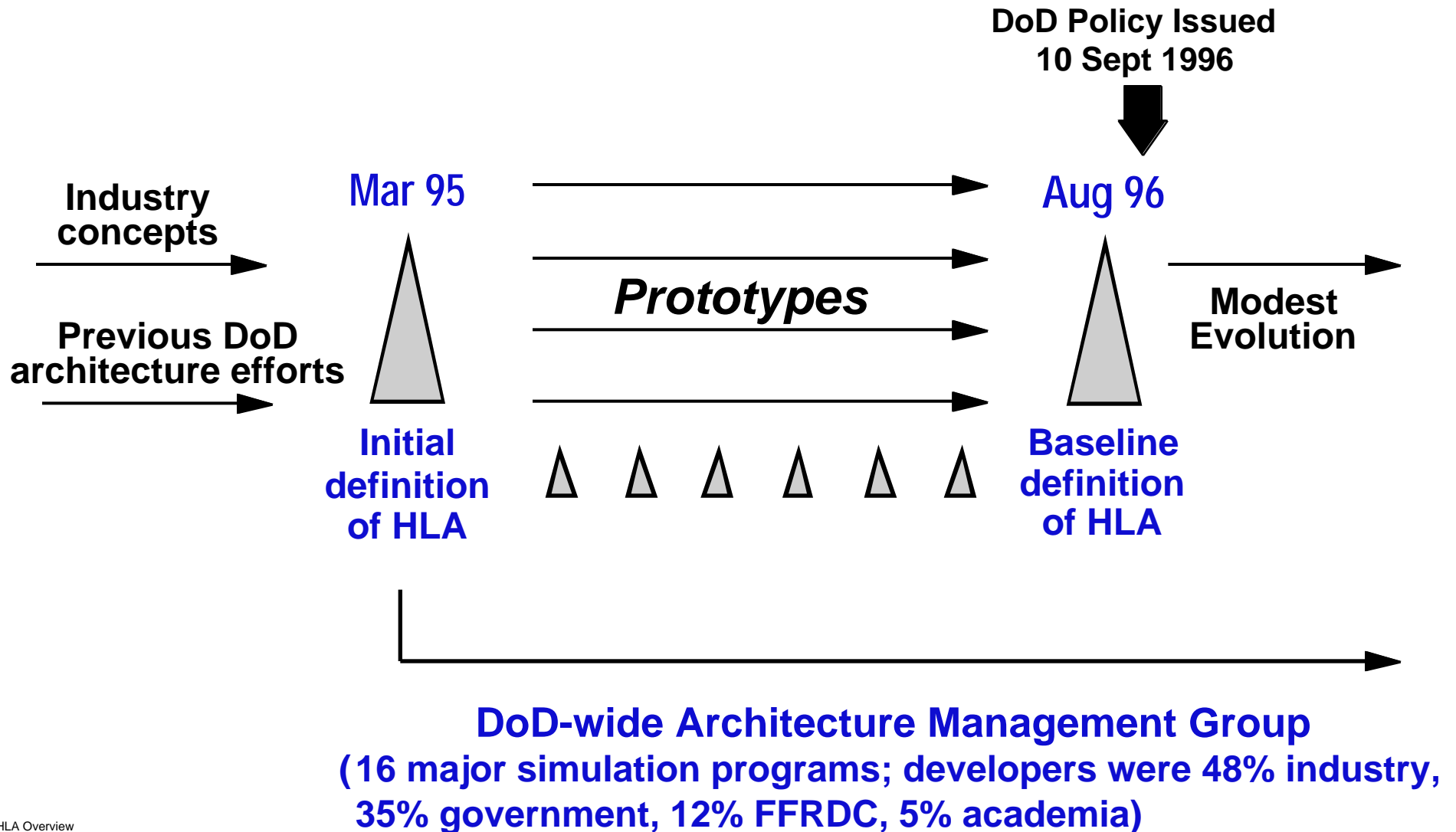
- **Major functional elements, interfaces, and design rules, pertaining to all DoD simulation applications, and providing a common framework within which specific system architectures can be defined**
- **HLA is the Technical Architecture for DoD Simulations**



# HLA Development Process Overview



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# Defining the HLA



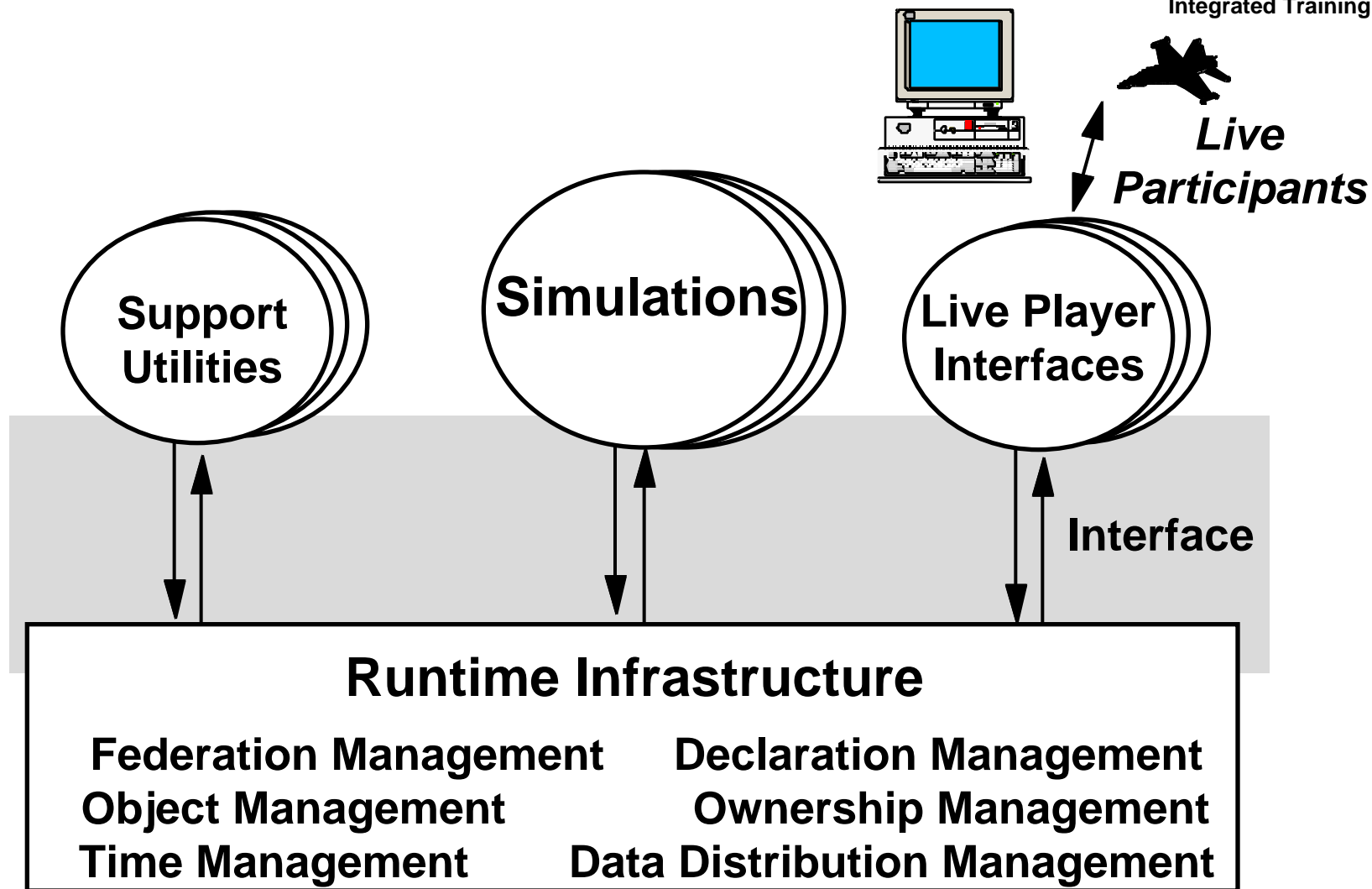
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- **HLA Rules**
  - A set of rules which must be followed to achieve proper interaction of simulations in a federation. These describe the responsibilities of simulations and of the runtime infrastructure in HLA federations
- **Interface Specification**
  - Definition of the interface functions between the runtime infrastructure and the simulations subject to the HLA
- **Object Model Template**
  - The prescribed common method for recording the information contained in the required HLA Object Model for each federation and simulation

# Functional View of the Architecture



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# HLA Object Models and OMT



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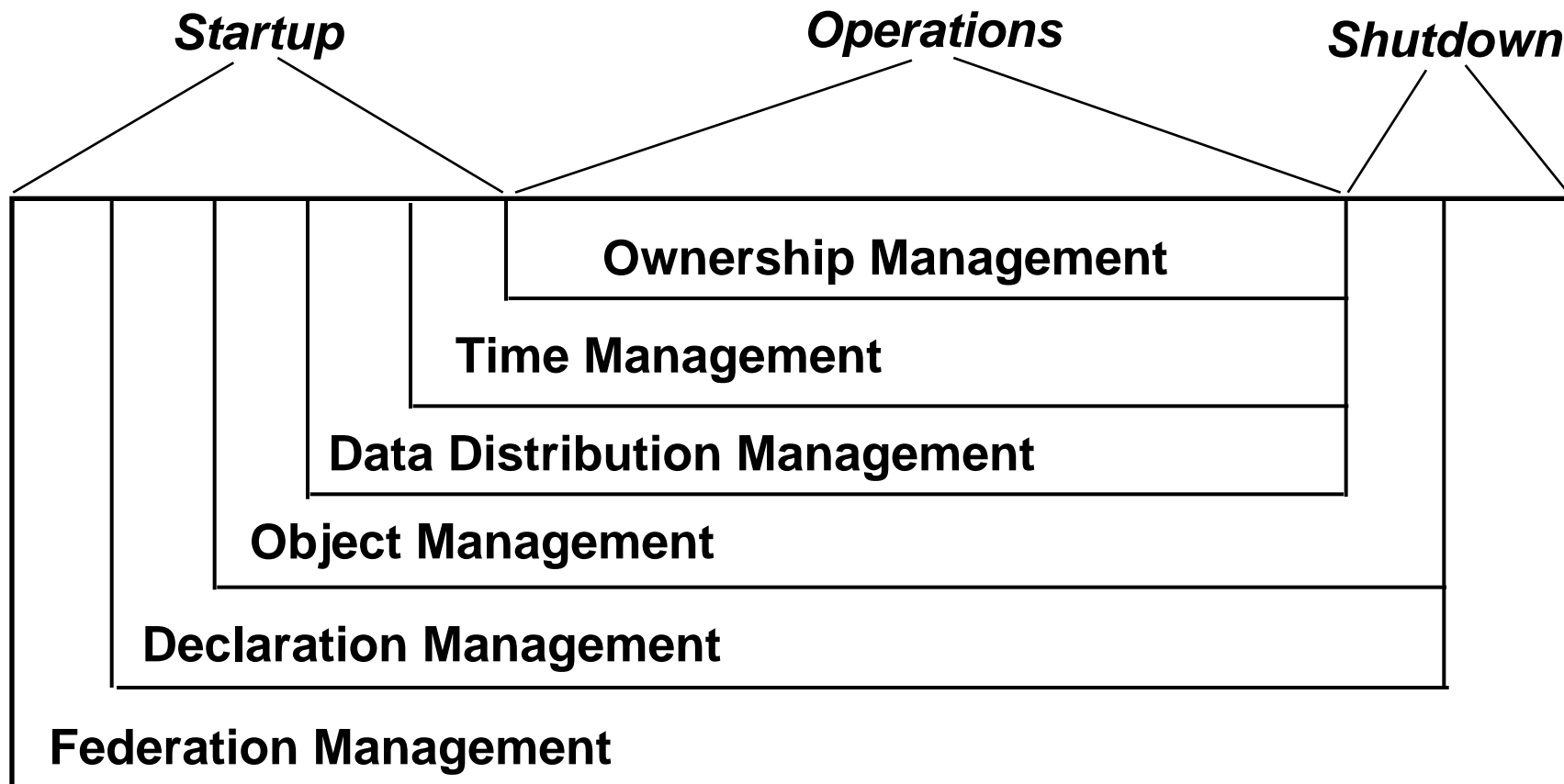
- **Federation Object Model (FOM)**
  - A description of all shared information (objects, attributes, associations, and interactions) essential to a particular federation
- **Simulation Object Model (SOM)**
  - Describes objects, attributes and interactions in a particular simulation which *can* be used externally in a federation
- **Object Model Template (OMT)**
  - Provides a common framework for HLA object model documentation
  - Fosters interoperability and reuse of simulations and simulation components via the specification of a common representational framework



# Use of Interface Over Life Cycle of a Federation Execution



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# Startup: Federation Management



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*Manage a federation execution throughout the life cycle*

- **Create Federation Execution**
  - **Initialize the RTI with Federation Specific Information**
    - Establish class, attribute, interaction names and hierarchies, as defined in FOM
    - Set default values for ordering and transport services
    - Establish names and dimensions of routing spaces (if using data distribution management services)
- **Join Federation Execution**
  - **Affiliates a federate with the federation execution**





# Startup: Declaration Management



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*Federate desires to generate and receive data*

- Publish Object Class and Publish Interaction Class
  - Informs RTI of ability to update attributes of classes of objects or send classes of interactions
- Subscribe Object Class Attribute and Subscribe Interaction Class
  - Informs RTI of desire to discover object attributes and classes of interactions



# Startup: Object Management



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*Supports creation, modification and deletion of objects*

- Request ID
  - Federate requests unique ID numbers from RTI
- Register Object
  - Links an object ID with an instance of an object
- Update Attribute Values
  - Provides current attribute values of an instance of an object
- Discover Object
- Reflect Attribute Values
  - RTI informs federates with a declared interest in attributes objects of their existence and their current values



# Startup: Data Distribution Management



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*Supports management of data distribution*

- Create Update Region
- Create Subscription Region
- Associate Update Region
  - Federate identifies subsets of routing spaces which meet data distribution needs of the objects it represents

# Startup: Time Management



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***Controls federate advance along with federation time***

- **Set default transportation event ordering type for object classes and interactions in FED**
- **Set Lookahead**
  - **If using event ordering services for any objects**

# Operations: Object and Time Management



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- **Object Management**
  - Update Attributes; Send Interactions
    - Federates export event data
  - Reflect Attributes and Receive Interactions
    - RTI delivers data to federates
- **Time Management**
  - Time Advance Request; Next Event Request, Flush Queue Request
    - Federates request time ordered event data from RTI
  - Time Advance Grant
    - RTI delivers events up to time requested along permission to move forward
  - Request . . . . Time
    - Federate queries RTI for time value

# Operations: Declaration and Data Distribution Mgt



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- **Declaration Management**
  - Publish Object Class or Interaction Class
  - Subscribe Object Class Attribute or Interaction Class
    - Federate can reissue data declarations, overriding previous
  - Control Updates and Interactions
    - RTI can inform federates of changes in need to update or send
- **Data Distribution Management**
  - Modify Region; Change Thresholds
  - Associate Update Region
  - Create Update or Subscription Region
    - Federate can change data routing by changing bound on regions, associating an object with a new region or creating or deleting regions



# Operations: Federation and Ownership Management



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- **Federation Management**

- Request Pause, Initiate Pause, Pause Achieved
- Request Resume, Initiate Resume, Resume Achieved
  - Federates can request that the federation pause operations and subsequently resume; RTI coordinates with all federates
- Request Federation Save, Initiate Federation Save, Federation Save Achieved
- Request Restore, Initiate Restore, Restore Achieved
  - Federates can request that the federation save state and subsequently restore to a particular saved state; RTI coordinates with all federates

- **Ownership Management**

- Federates can transfer ownership

# Shutdown



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- **Federation Management**
  - **Resign Federation Execution**
    - Indicates that a Federate chooses to cease participation
    - Triggers ownership transfer for attributes owned by resigning federate or deletes these attributes (options on the service call)
  - **Destroy Federation Execution**
    - Removes this federation execution from all RTI support; assumes all federates have resigned